

VIII.—On the true position of the Canaliferous Structure in the Shell of Fossil *Alveolina* (D'Orbigny). By H. J. CARTER, Esq., Assistant Surgeon, Bombay Establishment.

[With a Plate.]

IN the description of *Alveolina melo*, given at p. 170. vol. xi. of this Journal, I have stated, that the "transverse parallel ridges" seen on the outside of the fossil correspond to the "divisions," or rather partitions, in the interior of the chambers. D'Orbigny also has stated, that the chambers in *Alveolina* are "divided into a great number of capillary cavities by partitions longitudinal to the *enroulement*" (Foss. Foram. du Bassin Tert. de Vienne, p. 143); and so most people would think, judging from the external appearance of the shell; but when the interior is examined by a section made through the longitudinal axis (Pl. III. B. fig. 3), then these divisions and this canaliferous or capillary structure are seen to be confined to the external walls of the chambers, and to be completely excluded from their interior.

The oversight has arisen from the last whorls of the shell being in such close approximation with each other, that there seems in most instances to be no space for the chambers left between them, and hence the appearance of the openings of the capillary canals along the free border of the last-formed segment could hardly be inferred to lead to anything but the chambers themselves; while the intervals between the transverse ridges, too, would also lead to the inference that the latter were so many partitions dividing the chambers into as many cavities arranged longitudinally with respect to the direction or *enroulement* of the shell (figs. 3, 4).

It was only a few weeks since, however (although I had frequently seen and even sketched it), that I recognized the true position of this canaliferous structure, when cursorily examining some specimens of *Alveolina* which had been presented to the Asiatic Society of Bombay by Dr. Leith, and I was instantly struck with its analogy in position and nature to the reticular canaliferous structure in the spicular or marginal cord of *Operculina Arabica* (Pl. IV. vol. x.).

The canals are about 1-400th of an inch square, and the partitions which separate them about a third of this breadth (fig. 3 *b*), sometimes much thinner. They appear to open by a single row of apertures in the free edge of the last-formed segment of the shell, and from thence to be continued into the very centre, following the spire and being confined to the walls of the shell the whole way. On their course they dip inwards as they

cross the grooves, which, like those on the surface of a melon, divide the segments and offering a triangular space are filled up by corresponding portions of the shell in the form of ribs (fig. 1 *a*). Through each rib also there is a triangular canal (fig. 4 *b* & 5 *a*), which extends to either extremity of the fossil, where again it may have communicated with the exterior by a foramen or umbilical hole apparently in the latter (fig. 2 *a*). Behind and also internal to the triangular canal there appears to have been another longitudinal channel of communication, formed by a deficiency in the partitions of the canals at this part (fig. 4 *c* & 5 *b*). Although the partitions generally appear to have been continuous under the ribs, yet in many instances they seem to alternate, or nearly so, with the interspaces or canals in the adjoining segments. Whether there was any communication between the canals and the chambers (fig. 3 *b*) future investigation must determine; at present there appears to be no other outlet for them; and if this be the case with *Alveolina*, it may also be the case in many other forms of Foraminifera. Of what use then can the chambers be?

Although I have mentioned holes, channels, canals, and cavities in this fossil, yet in reality there is no such thing; but from their having been filled with transparent calc-spar they are easily recognized, in contradistinction to the white amorphous carbonate of lime which has replaced the shell itself.

The specimens of *Alveolina* in which I first noticed the position of this canaliferous structure were, as before stated, presented to the Asiatic Society by Dr. Leith, who broke off the portions of limestone containing them from rocks in the Bolan Pass, between the towns of Dadur and Quetta.

They are associated, as in Scinde and Arabia, with papyraceous *Orbitolites* (*Cyclolina*, D'Orbig.), and the white compact limestone containing them is that which in this part of the world is generally called "nummulitic;" but in only one or two instances have I seen *Alveolina* mixed with *Nummulites*, and then only very sparsely scattered throughout the mass, though it is quite possible that the opposite may be the case, for they must be close together. The easiness, however, of mistaking *Orbitolites* for *Nummulites*, in the rock, and the occurrence of *Cyclolina* and *Alveolina* together in great abundance in the white compact limestone of the south-east coast of Arabia (which I take to be the same as that of Scinde and the Bolan Pass) far below the position of the *Nummulites*, together with the existence of these two fossils in the Chalk of Europe (D'Orbigny), induces me to think, that much of the white limestone in the East is called "nummulitic," which will hereafter be found to be an equivalent of the Chalk.

